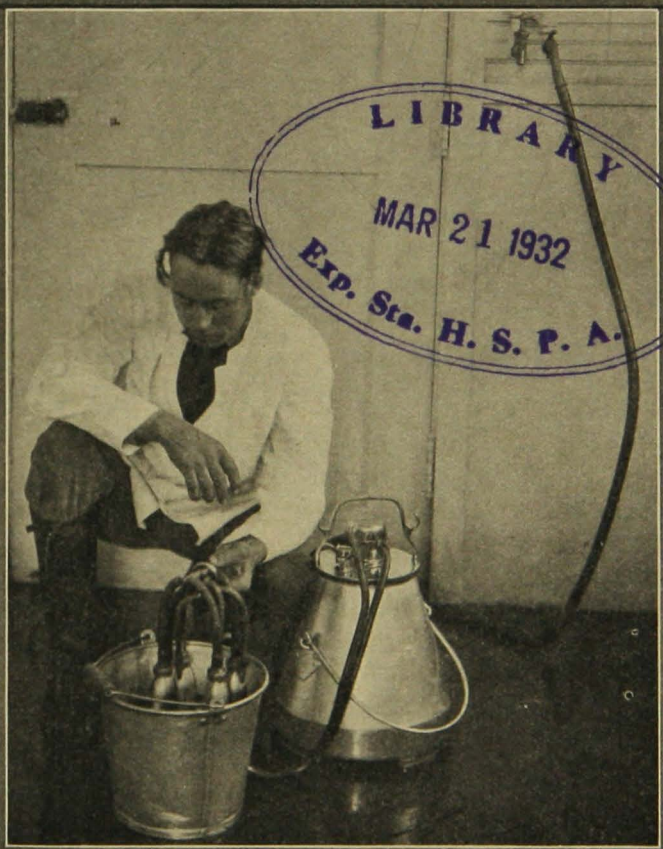
Special Bulletin 138 June 1931

CARE OF THE MILKING MACHINE

by Harold Macy Div. of Dairy Husbandry
Minnesota Experiment Station



UNIVERSITY OF MINNESOTA
AGRICULTURAL EXTENSION DIVISION

Published in furtherance of Agricultural Extension, Act of May 8, 1914. F. W. Peck, Director, Agricultural Extension Division, Department of Agriculture, Co-operating with U. S. Department of Agriculture.

CLEAN, healthful, marketable milk can be produced where milking is done by machine as well as where milking is done by hand. Close attention, however, must be given to the cleaning and sterilizing of the milker parts.

Cleanliness is absolutely necessary. The milking machine makes it possible to exclude more of the stable dust and dirt from the milk than is the case when cows are milked by hand. However, an unclean milking machine may be responsible for excessive bacterial contamination of milk, and in this way very decidedly reduce the keeping quality and wholesomeness of the product. Where a milking machine is used, the dairyman must make every effort to see that the parts are at all times clean and in proper condition for contact with such a perishable product as milk.

The chief sources of the contamination of mik drawn by a milking machine, in the order of their importance, are: (1) Teat cups, (2) rubber tubes, (3) pails and heads, (4) condensation water from the vacuum line, (5) stable air, (6) filth on teat cups if dropped on the floor.

Factors 4 and 5 may be guarded against partly by purchasing a machine that provides for the trapping of condensation water and the filtering of stable air. Factor 6 may be eliminated by ordinary care while moving the teat cups and head from one cow to another. The vacuum should be broken in one way or another while this is being done. Be sure that the teat cups do not fall on the floor or bedding while the vacuum is on. Shut off the vacuum for the teat cup or cups not being used when a cow has one or more blind quarters.

The work of cleaning and sterilizing a milking machine is not so irksome or so time-consuming as it may appear, and the results more than compensate for the time and effort. Many have discouraged the purchase of a milking machine on the grounds that the saving in time over milking by hand would not compensate for the extra labor required for cleaning the machine. This is not actually a fact. The care of the machine can be made relatively simple and need not require excessive time or labor. Once a satisfactory routine method is established, the procedure takes very little extra time.

Washing Teat Cups and Tubes

Immediately after milking, night and morning:

(1) Rinse the teat cups and tubes in cold or lukewarm water. To do this, place the water in an ordinary milk pail. Drop the teat cups into the bucket of water (see picture on cover), and while the machine is still attached to the suction line, allow the water to be drawn from the bucket through the teat cups, tubes, and head into the milker pail. Douse the teat cups in and out of the water at least ten times to aid in the

rinsing by drawing air and water alternately through the tubes. This leads to an expansion and contraction of the rubber parts and helps to loosen milk and other material. At this time see that the outside of teat cups and tubes are cleansed as well. Provide a fresh pail of water for each unit to be cleaned.

(2) When the milk has been thoroly washed out, fill the bucket with hot water to which some satisfactory alkali or dairy cleansing powder has been added. Draw this water through the tubes in order to wash out any remaining milk, particularly the fat. The water should be at 160 degrees Fahrenheit or higher in temperature.

(3) Fill the bucket with fresh, scalding water (over 170 degrees F.) and draw the water through the teat cups and tubes to wash out the alkaline cleaning solution and thoroly rinse the system. (If desired, in warm weather this may be followed by cold water.) After the teat cups and tubes have been washed as indicated, they may be detached from the machine, treated in (a) cold water, or sterilized by (b) the chemical, or (c) the heat method.

Treatment and Sterilization of Teat Cups and Tubes

a. Cold Running Water Method

Some dairymen have obtained good results by placing the teat cups and milk tubes in cold, running water, that is, when the temperature of the water is below 50 degrees F. The main objection to this method is that in the course of time certain types of water bacteria may develop in considerable numbers on the rubber parts and cause some trouble in keeping the bacterial content of the milk sufficiently low. It is not recommended in most cases.

b. Chemical Method

There are two common methods for sterilizing teat cups and tubes by means of chemicals: (1) immersing them in a bath containing the chemical, or (2) hanging them on a rack which is arranged so that a supply of the chemical solution is allowed to flow into the teat cups and tubes (see picture of solution rack).

Solutions

The chemical solutions used are generally prepared from one of the following compounds: (a) calcium hypochlorite, (b) sodium hypochlorite, (c) mixture of hypoch'orite and tri-sodium phosphate, (d) chloramine-t, or (e) caustic soda. In some cases, common salt or soda ash may be added to solutions containing the calcium or sodium hypochlorites in order to improve their stability.

The solutions of the above chemicals may be prepared as follows:

Home-made calcium hypochlorite solution.—A home-made calcium hypochlorite solution is made by mixing the contents of one 12-ounce can of chloride of lime with one gallon of fresh cold water, in a two-gallon covered crock. Be sure the chloride of lime is in a clean, fresh-looking container, plainly marked as to the content of available chlorine. Don't use it otherwise. In preparing the hypochlorite solution, first add just enough water to the chloride of lime to make a paste. Stir well and add the rest of the gallon of water. Allow this to stand overnight in a cool place. The clear greenish-colored liquid, which appears above the precipitated lime, is the part to be used. This liquid should be poured off carefully, siphoned off, or filtered through a fine muslin or strainer cloth. This home-made solution is just as effective as the commercial hypochlorite solutions and chloramine powders, and costs very much less. One quart of this solution added to 20 gallons of water, or one pint to 10 gallons of water, gives a satisfactory sterilizing solution for the teat cups and tubes.

Sodium hypochlorite solution.—This may be prepared from commercial sodium hypochlorite, which is sold in liquid or powdered form. An example of a commercial liquid sodium hypochlorite is "B.-K." and of the powdered form "H.T.H." It should be made up according to the manufacturer's directions.

Sodium hypochlorite-tri-sodium phosphate solution.—The sodium hypochlorite-tri-sodium phosphate preparation comes in crystalline form and should be prepared according to the directions appearing on the container. The product known as "Diversol" is representative of this preparation.

Chloramine-t solution.—The chloramine-t is usually in a powdered or crystalline form and likewise should be made up following the manufacturer's recommendations. The product known as "Sterilac" is representative of this preparation.

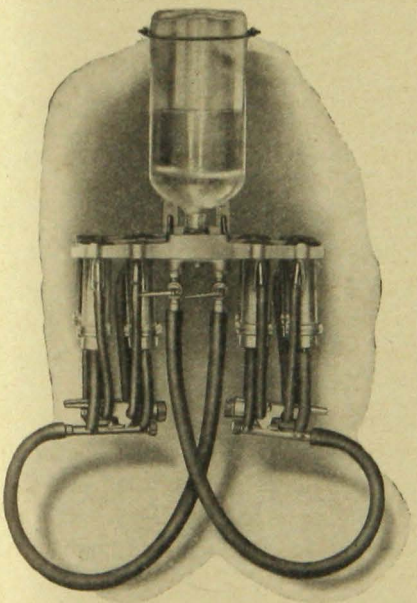
All of these solutions when ready for use should contain at least two hundred parts per million of available chlorine. When salt is to be used with such solutions, sufficient should be added that a surplus of salt appears in the bottom of the container. This requires about 50 pounds of salt to 20 gallons of water. If soda ash is used, add sufficient to make the solution mildly alkaline.

Caustic soda solution.—A 12-ounce can of household lye is dissolved in a gallon of clean water in a gallon bottle. This makes a 10 per cent solution. When ready to use, 4 fluid ounces of this solution are added to each gallon of water needed for the solution bath or rack.

Solution Bath Method

If the dairyman prefers to place the teat cups and tubes in a bath containing the sterilizing solution, a large earthenware covered crock is recommended. This should be kept in a cool place and kept clean. Place the clean teat cups and tubes in the sterilizing solution. Be sure that the teat cups are immersed slowly, so that the liquid may drive out the air in the tubes, in order that no air bubbles or spaces may prevent the solutions from reaching the entire surface of the rubber. Allow the parts to remain in the solution until just before time to milk. Then remove the teat cups and tubes from the solution, attach them to the head and the pail, and draw through some clean, cold water to rinse out the solution, thus eliminating any undesirable flavors that might be carried over into the milk.

When the teat cups and tubes are placed in the solution they must be clean, inside and outside. The solution should be kept clean at all times and should be renewed at frequent intervals. A fresh solution should be made up at least every month or oftener. It should be kept up to strength in the interval by adding sufficient of the concentrated preparations at least once or twice a week, especially in the summer. It is essential that the solution be maintained at proper strength at all times, so it may accomplish the purpose for which it is employed. The main objection to the use of the solution bath is that the dairyman often allows the solution to become so dirty or so weak that it is practically useless.



Solution Rack

A metal rack is provided with compartments for eight teat cups. The milk tubes are fastened to outlets fitted with stop cocks. A gallon bottle containing the sterilizing solution is inverted on the rack. The stop cocks are opened when the teat cups and tubes are in place. The solution is allowed to fill the tubes and run over the lips of the teat cups, after which the stop cocks are closed. The tubes and cups are left filled with the solution until the next milking period. (Courtesy of De Laval Separator Company.)

Solution Rack Method

If chemical solutions are to be used for sterilizing teat cups and tubes, the solution rack method is recommended. The illustration shows how it is employed. The bottle is filled with the sterilizing solution chosen and is then inverted in the rack. The liquid in the bottle is allowed to flow out so that the suspended

teat cups and tubes are completely filled with the solution, which is used only once. After the teat cups and tubes have been thoroly cleaned they are hung on the rack and the solution allowed to fill them completely. They remain on the rack until the next milking period when they are rinsed with cold water before using. This method makes it possible to have a fresh supply of the solution in contact with the parts to be sterilized each time they are to be treated. In this respect the method is much more satisfactory than the solution bath method.

c. Heat Methods

After washing and rinsing the teat cups and tubes as indicated before, place them in a vessel of clean water, thoroly submerging them. Then heat the water, preferably with steam, to a temperature of from 160 to 170 degrees F., testing with a good thermometer. Hold the water at this temperature from fifteen to thirty minutes. Then allow the water to cool and leave the teat cups and tubes in the water until you are ready to use them at the next milking. If steam is not available, the water may be heated on a stove in a wash boiler or other vessel until it reaches the boiling temperature. The teat cups and tubes may then be placed in the water and a cover put over the vessel, which is then removed from the stove. If the water is heated on a stove, the rubber parts should not be placed in the water until after the water is heated, as the heat from the stove may spoil the rubber. Otherwise a perforated wooden false bottom should be placed in the vessel to keep the rubber from direct contact with the hot metal.

Some persons prefer to remove the rubber parts from the hot water immediately after heating and place them on racks in the cooler or in a weak chlorine solution.

Alternate wetting and drying of rubber shortens its life so it should be kept moist at all times.

The rubber parts of milking machines now on the market are of good quality and will withstand the heat treatment for a reasonable period of time but should be replaced as soon as they show any signs of cracking or fatigue. The teat cup liners ordinarily have a shorter life than the milk tubes. Naturally the more often they are used the soooner they wear out and especially if the operator is careless in handling them.

Certain manufacturers sell special pressure sterilizing outfits which are quite satisfactory where plenty of steam is available.

The heat method gives excellent results when the proper temperature is used and precautions taken to protect the rubber parts from sudden changes, such as rapid drying.

Care of Stanchion Hose

The stanchion hose should be kept clean by washing, brushing, and thoro rinsing at least weekly. Frequent sterilizing is advisable. Where the machine is operated by individual stanchion pumps or where no check valve from the suction line is provided on the head, it should be sterilized daily with hot water, steam, or sterilizing solution.

Care of Metal Parts

The head, spigots, and pails in contact with milk may be washed in the same manner as ordinary milk utensils—by rinsing in cold water; washing thoroly with hot water to which a washing powder or alkali has been added; rinsing with clean hot water; steaming or scalding with boiling water; then thoroly dried and kept in an unexposed place.

Care of Vacuum Line

The entire vacuum line should also be cleaned occasionally with hot alkali water by flushing the system from the farthest stanchion cock. The water may be drawn through by suction. After flushing, the line should be rinsed with hot water, or steamed, and the piping thoroly drained. Do not use so much water that the vacuum tank will be overfilled and the water drawn through the pump. Water drawn through in this method of cleaning the pipe line may be drained from the vacuum tank drain cock and at stanchion cocks. If at any time milk is drawn into the vacuum line, it should be cleaned out immediately. All vacuum lines should be placed so that they slope to some point where they may drain readily.

Further Care of Machine

The rubber parts of the machine which come in contact with the milk should be removed and thoroly scrubbed with a convenient sized brush, in hot alkai water at least once each week—twice a week in summer. After that, they should be rinsed thoroly and returned to the sterilizing solution, or sterilized by the heat method. Butterfat has an undesirable effect upon rubber, especially when the parts are sterilized by heat, so in order to check the deterioration of the rubber, the parts should always be clean before sterilizing. The rubber parts often show accumulations of material which made them appear unclean. The washing with a brush and using a hot solution of caustic soda will remove such a deposit.

Testing Teat Cups for Leaks

If the metal teat cups are rubber lined, test them from time to time to see that there are no leaks through which milk might pass into the chamber between the inflation cup and the metal, and make trouble subsequently. The cups may be tested by placing them in a pail of water and blowing through the suction tube. If there is a leak in the rubber, bubbles will rise to the surface from the point of the leak.

If the foregoing directions are followed faithfully, there should be no difficulty in the production of clean, wholesome milk, so far as the use of a machine is concerned.